FIVE NEW GENERA OF FREE-LIVING MARINE NEMATODES FROM SANDY BEACHES OF EASTERN AUSTRALIA

DIETRICH BLOME

Blome, D. 2002 5 31: Five new genera of free-living marine nematodes from sandy beaches of eastern Australia. *Memoirs of the Queensland Museum* **48**(1): 29-43. Brisbane. ISSN 0079-8835.

Five new genera of free-living marine nematodes are described from exposed sandy beaches on the eastern coasts of Queensland and New South Wales. *Macquaria chimaira* gen. et sp. nov. (Chromadoridae), is distinguishable from other Euchromadorinae by the armature of the buccal cavity, the conspicuous posterior oesophageal bulb, and pre- and postcloacal ventromedian cuticular thickenings in the male. *Onchiolistia multipapillata* gen. et sp. nov. (Leptolaimidae) has an onchiostyle plus alveolar and tubular ventromedian supplements in the male thus separating it from other Camacolaiminae. *Procamacolaimus tubifer* Gerlach and Furstenberg & Vincx and *P. africanus* Furstenberg & Vincx are transfered to the new genus. The xyalid *Pseudechinotheristus nudus* gen. et sp. nov. is very closely related to *Echinotheristus* Thun & Riemann but distinguishable by the absence of the typical cuticular spines and the bladder-like supplements in male. *Dactylaimoides coronifer* gen. et sp. nov. differs mainly from other xyalid genera by the coarse, complicated cuticle with longitudinal crests with a point of reversal and the conspicuous light refractive crown-like ring in the anterior buccal cavity. *Paragonionchus sclerolabiatus* gen. et sp. nov. is set off from other xyalid genera by the coarse cuticle with longitudinal crests, the deeply incised lips with peculiar cuticularised supporting structures, and the arrangement of the cephalic sensillae.
❒ *Nematoda, eastern Australia, sandy beaches, taxonomy.*

Dietrich Blome, University of Applied Science Oldenburg/Ostfriesland/ Wilhelmshaven, Friedrich-Paffrath-Straße 101, D-26389 Wilhelmshaven, Germany (e-mail: dietrich.blome@t-online.de); *received 17 July 2001.*

This paper erects five new nematode genera based on material collected from exposed sandy beaches along the Australian east coast in 1997 and 1998 during investigations on latitudinal gradients in biodiversity of selected meiobenthic taxa (Free-living Platyhelminthes, Gastrotricha, and Free-living Nematoda).

MATERIALS AND METHODS

Collections considered here were made in Queensland on a beach next to the village of Thursday Island, on Forrest Beach at Innisfail, and on Alva Beach at Ayr, and in New South Wales on Ocean View Beach at Arrawarra, and on Shelly Beach at Port Macquarie.

Samples were taken in the intertidal zone at low water by pushing cylindrical perspex corers (2.4cm internal diameter and 5.0cm long) into the sand. Nematodes were extracted using the SMB-method (Noldt & Wehrenberg, 1984), fixed in 4% formaldehyde in tap water and processed to permanent glycerol mounts (Blome, 1983). Type material is deposited in the Queensland Museum, Brisbane.

ABBREVIATIONS. L=body length; a=L divided by maximum body diameter; b=L divided by oesophageal length; c=L divided by tail length; c.d.= corresponding diameter; h.d.=head diameter; juv. =juvenile(s); ♂ =male; ♀=female; g♀=gravid female; R_{1-3}=rings of cephalic setation; V=distance of vulva from head in % of L; i.a.=inter alia (among other things)

SYSTEMATICS

CHROMADORIDA Filipjev, 1929
CHROMADORINA Filipjev, 1929
CHROMADORIDAE Filipjev, 1917
EUCHROMADORINAE Gerlach & Riemann, 1973

Macquaria gen. nov.

DIAGNOSIS. Euchromadorinae. Cuticle complex with lateral differentiation formed by two longitudinal rows of enlarged dots joined by transverse bars. Amphids transverse slits without marked thickening of the margins. Cephalic sensillae in three separate rings, whereas the sensillae of the first ring are papilliform and the four setae of R_3 longer than that ones of R_2. Solid

dorsal tooth opposed by two small ventral teeth, all with flanges forming a cylindrical posterior part of buccal cavity. Oesophagus with well developed posterior bulb. Males with single outstretched anterior testis, right of the intestine. ♀♀ with opposed, reflexed ovaries, the anterior one right, the posterior one left of intestine. Spicular apparatus consisting of weakly cuticularised, arcuate spicules, a gubernaculum of irregular shape, and lateral pieces of indistinctly L-shaped form. Ventrally pre- and postcloacal cuticular thickenings in ♂♂. Tail conical with three indistinct caudal glands.

TYPE SPECIES: *Macquaria chimaira* sp. nov.

ETYMOLOGY: From Port Macquarie, NSW.

DISCUSSION. Members of Euchromadorinae are mainly characterized by complex cuticle, often with lateral differentiation and with a point of reversal in the pattern; buccal cavity mostly with solid dorsal tooth and often with series of denticles; amphids transverse slits or oval openings with double contour; oesophagus mostly without definite posterior bulb; most genera with hammer- or L-shaped lateral pieces; precloacal structures or supplements usually absent.

The Euchromadorinae is widely regarded as containing 10 genera (Warwick & Coles, 1975; Platt & Warwick, 1988), to be supplemented by *Crestanema* Pastor de Ward, 1985.

Two of those genera do not have lateral pieces (*Endeolophos* Boucher, 1976; *Trochamus* Boucher & Bovée, 1972), and *Diriconema* Steiner & Hoeppli, 1926 is known from a female, only. *Actinonema* Cobb, 1920 and *Rhips* Cobb, 1920 are both characterized by amphids with double contours and by double-jointed spicules in the latter genus. *Parapinnanema* Inglis, 1969, *Nygmatonchus* Cobb, 1933 and *Crestanema* have 10 (6+4) cephalic setae in one ring, departing from the usual pattern in this respect.

Euchromadora de Man, 1886 is distinguished from *Macquaria* in having denticles and by lacking a lateral cuticular differentiation, a posterior oesophageal bulb, and pre- or postcloacal structures.

In *Graphonema* Cobb, 1898 the dorsal tooth appears hollow (Platt & Warwick, 1988), and there is no posterior oesophageal bulb, no precloacal differentiation, and no lateral differentiation of the cuticle.

Parapinnanema is similar to *Graphonema* but differs from the latter in having prominent precloacal structures in the male, and shares this character with *Macquaria*.

Steineridora Inglis, 1969 has a massive squarish dorsal tooth, denticles and a posterior oesophageal bulb, but shows neither a precloacal differentiation nor a lateral differentiation of cuticle.

According to Pastor de Ward (1985), *Crestanema* shows 6+4 cephalic setae in one ring, oval amphids with simple contour and a lateral differentiation of cuticle different in structure from that in *Macquaria*.

Macquaria is characterized by a unique combination of Euchromadorinae characters: the dorsal tooth is obviously solid in its basal part and in the dorsal shoulder, and there are flanges on the lateral walls of oesophastome as well as ventral onchia (cf. *Graphonema*). The cuticle in the anterior part of the oesophagus is more thickened (cf. *Parapinnanema*) and the oesophagus has a conspicuous posterior bulb (cf. *Steineridora*).

The amphids are faint, without surrounding fringe of cuticle, and there is a distinct lateral differentiation of the cuticle from the anterior end to the tail-tip.

Macquaria chimaira sp. nov.
(Fig. 1)

MATERIAL EXAMINED. HOLOTYPE, QMG218930, δ_1, Port Macquarie, Shelly Beach, 03.09.1997, embedded in glycerol. D. Blome. PARATYPES, QMG218931, δ_2, same data as holotype, and QMG218932, g♀, Arrawarra, Ocean View Beach, 25.08.1997. D. Blome. OTHER MATERIAL. ♀, g♀, 1 juv. – Port Macquarie, Shelly Beach; 3♂, 3g♀ – Arrawarra, Ocean View Beach. D. Blome.

ETYMOLOGY. Greek *chimaira*, monstrosity composed from parts of a lion, goat, and snake (Greek mythology) – referring to the mixture of characters of Euchromadorinae combined in this new genus.

MORPHOMETRIC DATA. δ_1 (holotype): L = 1019µm; a = 35.1; b = 7.5; c = 7.8; Spicules 30µm on the chord. δ_2: L = 1024µm; a = 37.9; b = 7.8; c = 8.0; Spicules 27µm on the chord. g♀: L = 872µm; a = 30.3; b = 7.5; c = 8.7; V = 54%.

DESCRIPTION. Relatively slender, gradually tapering from neck region towards head.

Males (mainly referring to holotype): Cuticle complex; in neck region, especially anterior to nerve ring, relatively coarsely punctated, thick. Posterior to head annules first are finely dotted, from the second pair of ring pores the coarser dots fuse into notched annules all over the total body

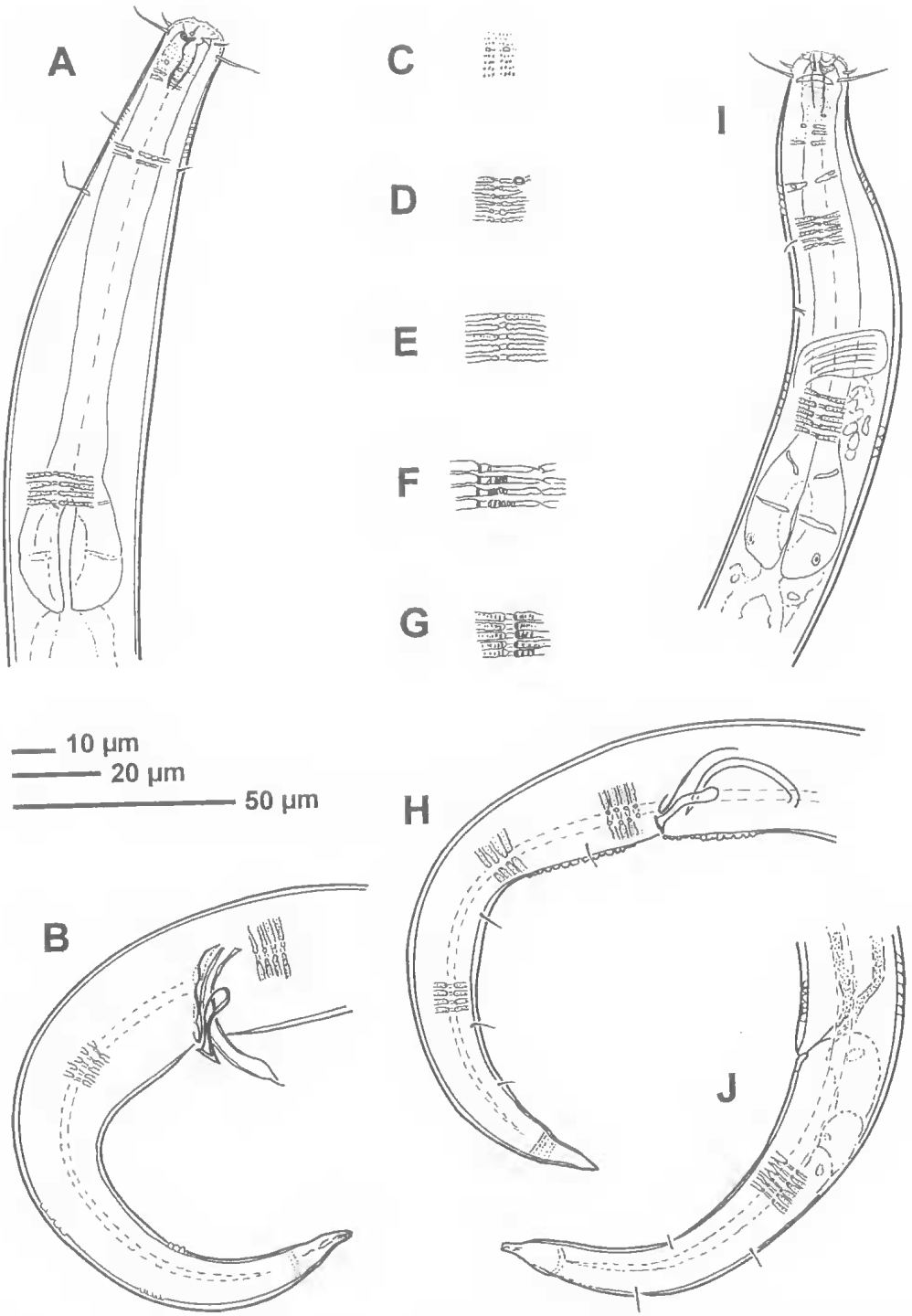

FIG. 1. *Macquaria chimaira* gen. et sp. nov. A-G, ♂, holotype: A, head; B, tail region and spicular apparatus; cuticular structure C, behind head (from 1. ring); D, at neck region (18. ring and posterior); E, at end of oesophagus; F, at middle of body-length; G, at cloacal region. H, ♂, paratype 2: tail region. I-J, gravid ♀, paratype: I, head; J, tail region.

length. A lateral differentiation of two longitudinal rows of larger dots (1.6μm apart at head, 2.4μm at cardia and anus, and 3.2 in middle of the body), joined by transverse bars, runs from the head to the spinneret. Those enlarged dots are flanked by transverse rows of finer punctations. Amphids transverse slits, 4.8 μm posterior to front end (i.e. more or less at level of R_3), 8.0μm wide (62% of c.d.) and 1.6μm in length. Cephalic setae in 3 separated rings: R_1 papilliform, R_2 6 setae of 4μm length, R_3 4 12μm long setae. Dorsal tooth medium sized, solid, slightly sickle-shaped, with flange of 12μm length; opposed by two tiny ventral teeth with flange of 11μm, curved. Buccal cavity in total 16–17μm long and in its posterior (cylindrical) part 2.4μm wide. Oesophagus with prominent posterior bulb measuring 31x24μm. Ventral gland not seen; an exit pore is located at 62μm posterior to anterior end in δ_1 and at 68μm in δ_2. The single, outstretched, anterior testis is situated to the right of the intestine. Details of the male gonad,especially of the vas deferens, not visible. Spicules slender, arcuate, weakly cuticularised, non-alate; distally with a nailform tip. Gubernaculum close to the spicules, of irregular shape; proximally curved and acute, distally rounded, blunt, measuring 24μm in δ_1 and 22μm in δ_2. Lateral pieces simple, indistinctly L-shaped, 16μm long; proximal end well rounded, distally slightly widened and with sharp edges. Anterior to the cloaca the ventral body cuticule (with coarser annulation) is thickened into a distinctively raised area of about 20μm length. Postcloacally the same holds for a distance of about 25μm. Tail conical, 4.5-5.1 of anal body diameter long. Three indistinct caudal glands. Four pairs of subventral setae.

Female (paratype): Resembling the male in general appearance. Exit of the ventral gland at 56μm posterior to the anterior end. Ovaries opposed, reflexed; anterior one right, posterior one left of intestine. Tip of anterior ovary 90μm anterior to vulva, reflexion at 236μm anterior to vulva. Tip of posterior ovary 108μm posterior to vulva, reflexion 228μm posterior to vulva. Vagina wide, well cuticularised respectively muscular. Uteri as spermathecae, filled with voluminous, round to oblong sperm cells.

DIAGNOSIS. As for genus

LEPTOLAIMINA Lorenzen, 1981
LEPTOLAIMIDAE Örley, 1880
CAMACOLAIMINAE Micoletzky, 1924

Onchiolistia gen. nov.

DIAGNOSIS. Cuticle thick, coarsely annulated; annules bearing faint longitudinal striae. Amphids ventrally wound modified spirals with circular to oblong apertures, situated at level of the cephalic setae (R_3). Buccal cavity nearly cylindrical with a solid onchiostyle in the dorsal wall, which possibly may be protrusible (Fig. 2C). Oesophagus indistinct, embedded in glandular tissue, at its posterior end being slightly clavate. Due to the position of the only male on the slide and its state of preservation no details of the male gonad visible. Female gonad monodelphic with one reflexed posterior ovary left of intestine. In male alveolar ventromedian supplements from the head end to nearly the mid of total body length plus tubular ventromendian supplements, present in precloacal position. Proximal ends (capitula) of spicules sharply bent ventrad. Tail uniformly conical with acute tip (spinneret), three caudal glands. Male tail with one indistinct ventromedian sensilla.

TYPE SPECIES. *Onchiolistia multipapillata* sp. n.

OTHER SPECIES. *Onchiolistia tubifera* (Gerlach, 1953), syn. *Procamacolaimus tubifer* Gerlach, 1953 sensu Gerlach (1953, 1962) and Furstenberg & Vincx (1988) comb. nov.; *Onchiolistia africana* (Furstenberg & Vincx, 1988), syn. *Procamacolaimus africanus* Furstenberg & Vincx, 1988 comb. nov..

ETYMOLOGY. With an onchiostyle in the dorsal wall of buccal cavity and closely related to *Listia* Blome, 1982.

DISCUSSION. Hope & Tchesunov (1999) revised the Camacolaiminae, gave a generic key and, among other taxonomic changes, synonymized *Eontolaimus* Furstenberg & Vincx, 1988 with *Listia*, transferring the latter into the Camacolaiminae. *Onchiolistia* is now added to the family. *Onchiolistia* resembles *Listia* apart from its onchiostyle.

The combination of such characters (onchiostyle+alveolar and tubular, ventromedian supplements in male) is only known from the descriptions of *Procamacolaimus tubifer* Gerlach, 1953 from Madagascar, later redescribed from the Maldive Islands (Gerlach, 1962) and a South African sandy beach (Furstenberg & Vincx, 1988).

Following the original diagnosis of *Procamacolaimus* (type-species: *P. acer* Gerlach, 1954)

the author did not mention nor depict alveolar, ventromedian supplements. Gerlach (1962:103) and Gerlach & Riemann (1973:47) noted that *Procamacolaimus* sensu Gerlach (1953a:82) and Gerlach (1953b: 602) are invalid names. Hence *P. tubifer* Gerlach, 1953 from Madagascar and *P. tubifer* Gerlach, 1962 from the Maldive Islands as well as the redescription of the species by Furstenberg & Vincx (1988) do not belong to this genus - nor does *P. africanus* Furstenberg & Vincx, 1988. Both species have to be transferred to the new genus because of the onchiostyle + alveolar and tubular ventromedian supplements in males.

Onchiolistia multipapillata sp. nov. (Fig. 2)

MATERIAL EXAMINED. HOLOTYPE, QMG218933, ♂, Thursday Island, beach south of the village, 12.10.1997, embedded in glycerol. D. Blome. PARATYPES, QMG218934, g♀$_1$ and QMG218935, g♀$_2$, same data as holotype. OTHER MATERIAL: g♀, 1 juv.; same data as holotype.

ETYMOLOGY. Latin *multus*, many, numerous; *papillatus*, provided with papillae.

MORPHOMETRIC DATA. ♂ (holotype): L = 1744µm; a = 49.8; b = 6.9; c = 16.8; Spicules 44µm on the chord. g♀$_1$: L = 1352µm; a = 35.6; b = 6.0; c = 11.3; V = 43%. g♀$_2$: L = 1216µm; a = 32.9; b = 5.4; c = 13.5; V = 45%.

DESCRIPTION. Body long, slender, nearly constant in width but significantly tapering towards the extremities. Anterior end measuring about 30% of the maximum body diameter, tail near tip also.

Male (holotype): Cuticle thick (1.6µm), coarsely annulated. Annules 2.4µm wide, with faint longitudinal striae. Body setation lacking, apart from 8-9 short (2.4µm) scattered papillae in the neck region and 4 pairs of mostly subventral setose papillae on the tail. Hypodermal glands not seen. Amphids at level of the 4 cephalic setae, about 2.5µm posterior to front end. They are ventrally wound and the apertures have a circular to oblong spiral contour (open posteriorly) of 6.4 µm length and 3.2µm width (33% of c.d.). Sensillae of R_1 and R_2 not seen. Four cephalic setae (R_3) of 14µm length (1.5 of c.d.). Buccal cavity approximately cylindrical (8.8x4.0µm) with a solid 8.8µm long onchiostyle in the dorsal wall. At least the anterior end of the onchiostyle is free from the surrounding tissue, the basal part of it is connected with the oesophageal tissue. The oesophageal musculature is indistinct, details of the cardia not visible. The intestinal tissue is also indifferent. Ventral gland or its exit pore not seen. Due to the position (the body is twisted) and the state of preservation of the male no details of the gonad are visible. Spicular apparatus visible only in dorsal view. Capitula and distal ends of the spicules ventrally directed. Distal ends appear thickened due to the close gubernacula. All structures delicately cuticularised and of irregular contour. There are 6 precloacal tubular supplements of 16µm length, arranged at approximately regular distances (22-34µm, mean = 27µm), anteriormost one 160µm, posteriormost 34µm precloacal. A ventromedian row of 93 alveolar sensilla begins 35µm behind the head and ends at 848µm distance (= 47% of the body length). The alveoli mostly are equal-spaced, but some are arranged irregularly. Tail conical, 3.5 of cloacal body diameter long, tip pointed. Caudal glands inconspicuous. Four pairs of subventral setose papillae. An indistinct ventromedian papilla-like structure is situated at about 60% of the tail length.

Female (paratypes): General body shape similar to the male. Cuticle naked apart from three pairs of inconspicuous setose papillae (5µm) in the neck region, whereas one pair is situated in front of a ventral pore and one pair behind it. One pair of postanal setose papillae of 4 µm length. Shape of the amphids as in male, obviously more circular, 5µm long and 4µm wide (56% of c.d.). Four cephalic setae measuring 13µm , which equals 1.9-2.2 of head width. Buccal cavity 6µm in length and 3µm in width, onchiostyle measuring 7µm. In ♀$_1$ the onchiostyle appears to be protrusible (Fig. 2C). A ventral pore opens at 59% of oesophageal length (132µm behind anterior end). Ventral gland not seen, due to the diffuse and glandular tissue surrounding the oesophagus. About 28µm behind that ventral pore in ♀$_2$ the oesophagus widens slightly from 9 to 12-16µm, forming a slender longish bulb comparable to that seen in plectids or dorylaimids. This posterior part of the oesophagus appears glandular, diffuse. The area around the ventral pore is filled with large, globular, glandular cells. Gonad monodelphic with one posteriorly reflexed ovary. A prevulvar spermatheca extending about 110µm to the anterior in ♀$_1$, containing several big, globular sperm cells. In ♀$_2$ the ovary has a total length of 336µm, the reflexion is situated 208µm behind the vulva (i.e. 750µm behind anterior end), the ovary tip is located 80µm posterior to vulva (i.e. 622µm behind anterior end). The total gonad is situated at the left of the intestine. Vulva

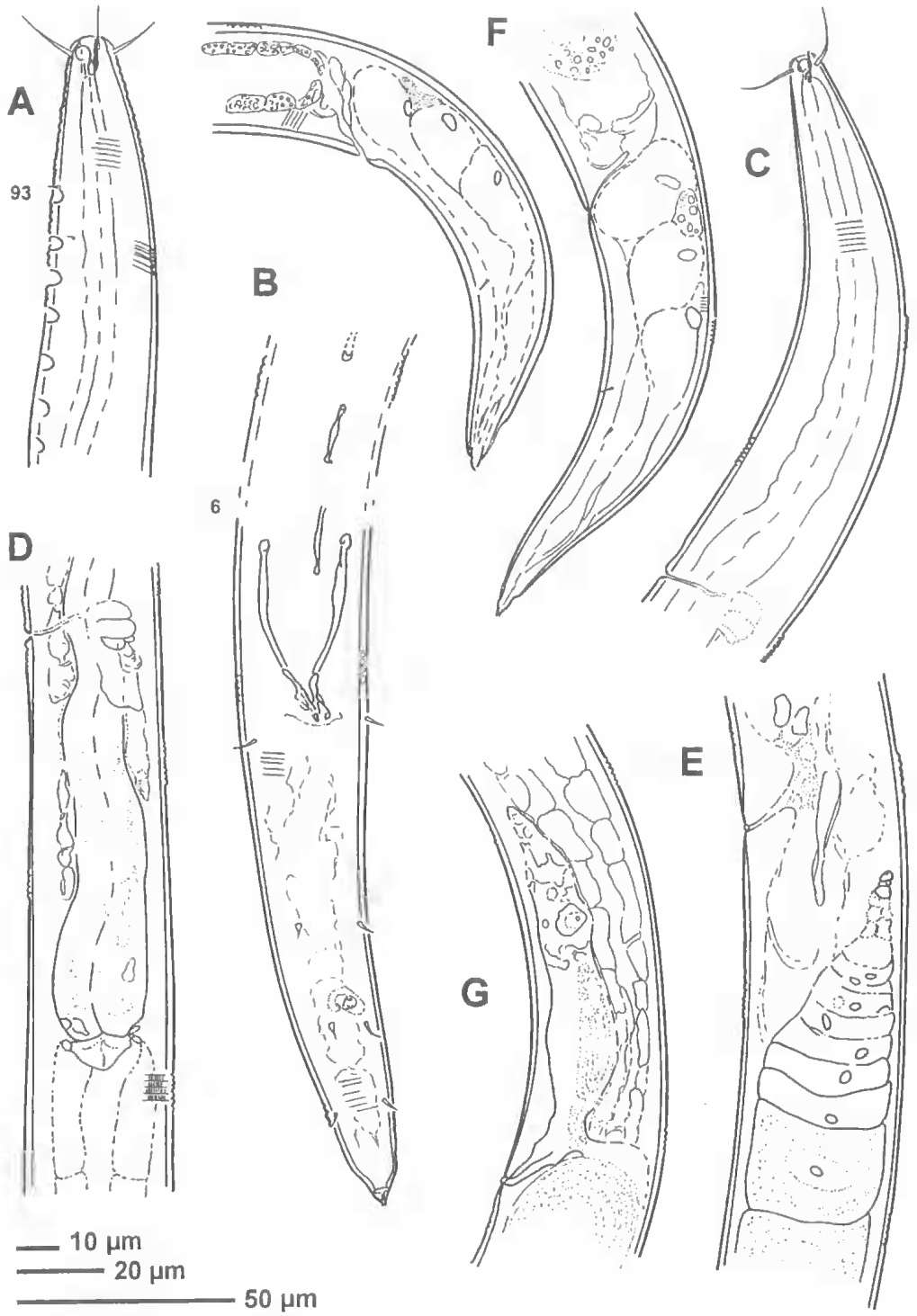

FIG. 2. *Onchiolistia multipapillata* gen. et sp. nov. A-B, ♂, holotype: A, head; B, tail region and spicular apparatus. C-F, gravid ♀, paratype 1: C, head; D, end of oesophagus; E, posterior part of ♀ gonadal tract (ovary); F, tail region. G-H, gravid ♀, paratype 2: G, anterior part of ♀ gonadal tract (spermatheca); H, tail region.

premedian (43-35%), vagina being a narrow duct of 12µm length, directed anteriorly, with a weakly light refractive inner lining, altogether indistinct. Mature egg: 90x29µm. Tail conical, spinneret well sclerotized, about 6-7µm long, which equals the non-annulated terminal end. Three caudal glands. One pair of setose papillae (3µm) at about half the length of tail.

REMARKS. *Onchiolistia multipapillata* sp. nov. is distinguished from the two congeneric species *O. africana* and *O. tubifera* generally by its larger body dimensions, length of cephalic setae (R_3) and length of spicules. Further the number of alveolar supplements in the male is about double that in the congeneric species, and finally, the size of male amphids in the new species is considerably less (33%) than in the other two species (40-50% in *O. tubifera* and 80% in *O. africana*).

MONHYSTERIDA Filipjev, 1929
MONHYSTEROIDEA de Man, 1876
XYALIDAE Chitwood, 1951

Pseudechinotheristus gen. nov.

DIAGNOSIS. Cuticle coarsely annulated; annules bearing faint longitudinal striae. Amphids inconspicuous, transversely oval, showing sexual dimorphism in shape and size. Cephalic sensillae in two separate rings of the typical 6 + (6+4) pattern. Buccal cavity conical, with prominent ring in anterior part and funnel-shaped transition to oesophagus. Cardia small, glandular. Progaster with ciliary inseam. Ventral gland not seen. Testes opposed, outstretched, anterior one to the left, posterior one to the right of intestine. Spicules slightly asymmetrical in length, well cuticularized; proximally with a ring-like bulge, distally bifid. Lateral pieces well cuticularised of complicated form, distally bifid. No precloacal supplements. Female gonad monodelphic with an outstretched ovary left of intestine. Tail conical, plump. Two large caudal glands opening into two separate conical outlets.

TYPE SPECIES. *Pseudechinotheristus nudus* sp. nov.

ETYMOLOGY. Greek *pseudes*, remarkably like - similar to *Echinotheristus*.

DISCUSSION: The new genus is very close to *Echinotheristus* sharing several peculiar characters with the latter as: general body shape, similarities in the head region (setation, ring in the buccal cavity, shape of buccal cavity), the shape of amphids, and details in the male or female gonadal tract, respectively, and the situation at tail end (number and details of caudal glands, number and arrangement of spinnerets).

But the new genus is also clearly set off from *Echinotheristus* by the absence of both precloacal supplements and of transverse rows of small spines on the cuticular rings. In *Pseudechinotheristus* the amphids show a significant sexual dimorphism in size, though it is not clear, if the amphids are bladder-like or not.

Echinotheristus is mainly characterized by the bladder-like precloacal supplements being reminiscent of structures in limnetic *Tobrilus* species (Thun & Riemann, 1967) and the cuticle covered by transverse rows of small spines, thus set off from all other Xyalidae.

Because of the similarity to *Echinotheristus* (i.a. ciliary inseam in the progaster region), but recognizing the difference from it in decisive characters, *Pseudechinotheristus* is erected and refers to that similarity. *Echinotheristus* is known only from sublittoral coarse sands of the North Sea whereas *Pseudechinotheristus* in Australia is found only in intertidal medium to fine sands.

Pseudechinotheristus nudus sp. nov. (Fig. 3)

MATERIAL EXAMINED. HOLOTYPE, QMG218936, δ_1, Ayr, Alva Beach, 01.10.1997, embedded in glycerol. D. Blome. PARATYPES, QMG218937, δ_2, QMG218938, φ_1 and QMG218939, φ_2, same data as holotype. OTHER MATERIAL. 28δ, 11φ, 14 gφ, 26 juv., same data as holotype.

ETYMOLOGY. Latin *nudus*, naked – refers to the absence of cuticular spines and bladder-like supplements.

MORPHOMETRIC DATA. δ_1 (holotype): L = 840µm; a = 27.1; b = 4.4; c = 7.5; Spicules: 50µm (left) and 41µm (right) on the chord. δ_2: L = 856µm; a = 25.2; b = 4.3; c = 8.6; Spicules: 52µm (left) and 42µm (right) on the chord. φ_1: L = 864µm; a = 22.7; b = 4.3; c = 8.3; V = 71.3%. φ_2: L = 936µm; a = 22.3; b = 4.1; c = 8.5; V = 71.8%.

DESCRIPTION. Body moderately slender, approximately continuous in width, only slightly tapering towards the anterior end, but most prominent from the amphids anteriad.

Males (mainly referring to holotype): Cuticle coarsely annulated, anterior to the amphids more finely as well as immediately before the spinnerets. Annules with faint longitudinal striae, which sometimes appear to be dot-like. Small spines, arranged in transverse rows, never seen. Longitudinal rows of submedian setae from the posterior end of amphids towards the tail. Setae in the neck region, especially at cardia, longer than

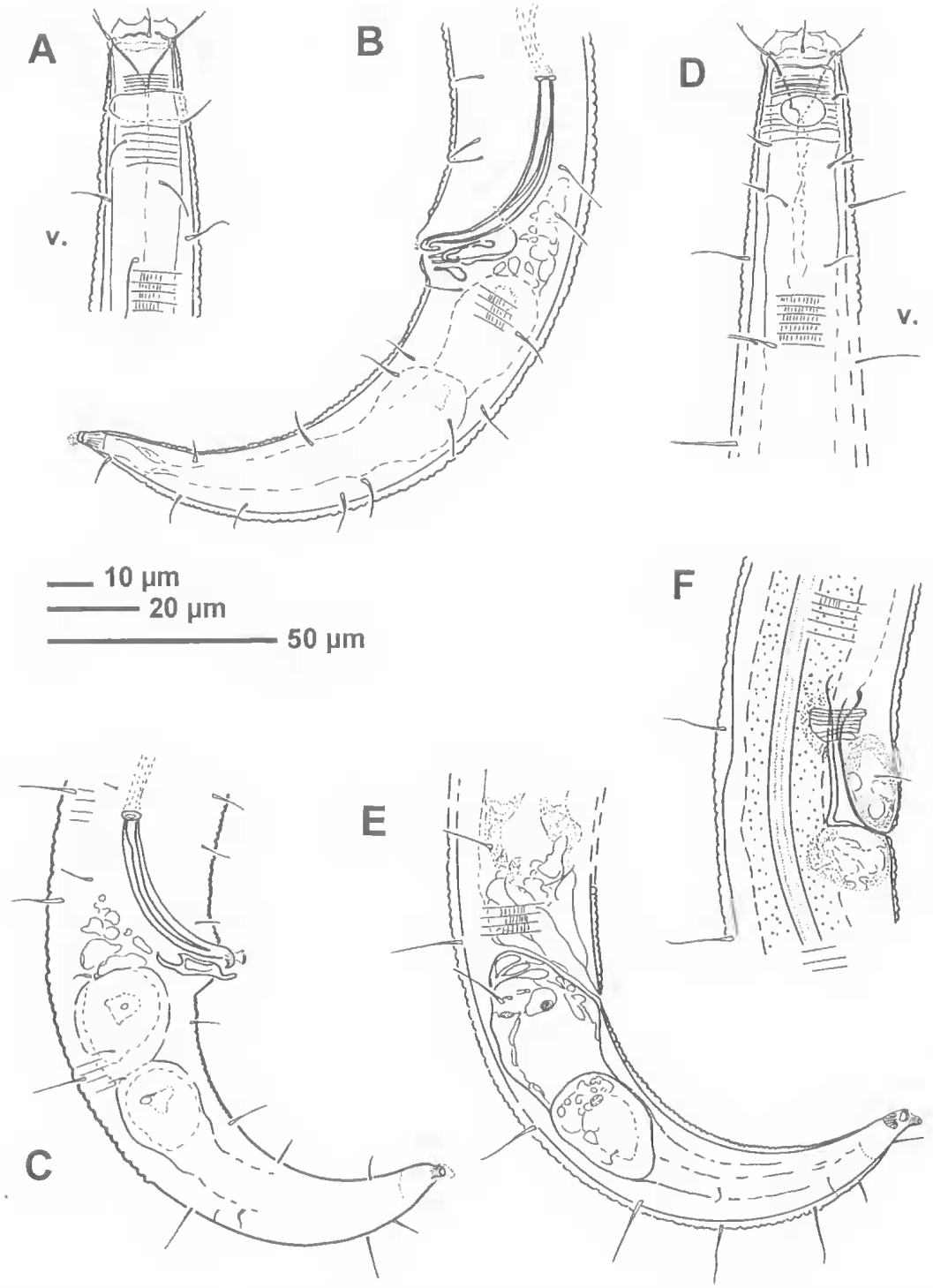

FIG. 3. *Pseudechinotheristus nudus* gen. et sp. nov. A-B, ♂, holotype: A, head; B, tail region and spicular apparatus from the left. C, ♂, paratype 2: tail region and spicular apparatus from the right. D-F, ♀, paratype 1: D, head; E, tail region; F, vulvar region. (v = ventral side).

rest of the body setae: the subventral setae measuring 12-13μm, the subdorsal ones 13-15 μm. Other body setae measuring 8μm subventrally and 12μm subdorsally. Amphids bladder-like? Contours inconspicuous, marked by the absence of cuticular annulation mainly, broadly transverse, covering the total width of the body, i.e. at least 100% of the corresponding diameter (c.d. = 18 μm). They are situated 16μm (= 1 h.d.) posterior to front end and are 7-9μm long. Six acute, conical labial sensillae in R_1, 6 + 4 cephalic setae in one ring measuring 6 and 9-10 μm in length. Buccal cavity with prominent ring in anterior part and with funnel-shaped transition to the oesophagus. Dorsal wall for a stretch of 12-13μm more sclerotized than the ventral one. Cardia small, glandular. Progaster lined by a ciliary inseam. Ventral gland not seen, but in δ_2 an (exit?) pore at 76μm posterior to head end. Testes opposed, outstretched. Anterior testis situated subventrally to the left of intestine, posterior one to the right of intestine. Vas deferens ventral to intestine, appears glandular. Two long-stretched ejaculatory glands in tandem, at each side of the intestine subdorsally. Spicules slightly asymmetrical as to their length, well cuticularised and regularly bent; distally recurved-bifurcated, proximally surrounded by a ring-shaped bulge. Lateral pieces well cuticularised and distally bifurcated as well; proximally, from the dorso-caudal branch sending a membaneous process anteriad, passing the spicules laterally. No supplements or ventromedian precloacal differentiations. Tail conical with two large caudal glands, opening into two separate conical outlets with two separate ampullae. Bases of the outlets with radial striae. Cell-bodies of the caudal glands filled with thread-like or laminar structures. Tip of tail bent to the left.

Females (paratypes): General body shape similar to the males. Amphids transversely oval, inconspicuous, 13-15μm behind anterior end and 6-7μm long. They have 40-50% of the corresponding diameter in width. The 10 (R_2 + R_3) cephalic setae are of 6-8 and 10μm length. Buccal cavity as in males. Cardia small, conoid (heart-shaped) and about 11μm long. In the progaster filamentous structures visible, lumen of intestine covered by a hyaline layer. Ventral gland not seen, but in φ_2 an (exit?) pore about 76 μm posterior to head end. Gonad monodelphic with an outstretched ovary left of intestine; no postvulvar structures. Germinal zone of ovary about 200μm behind anterior end. Distal part of the gonad (80μm anterior to proximal part of vagina) appears swollen, thin-walled, and contains spherical to ovoid sperms with hyaline, dotted outline; probably acting as spermatheca. Measurement of a sperm: 6x4μm. Vagina with an anterior and posterior vulvar gland, about 34-37μm long, and with a well cuticularised inner lining. Proximally surrounded by a circular sphincter. Vulvar lips without prominent structures like small papillae. Tail as in males.

DIAGNOSIS. As for genus.

Dactylaimoides gen. nov.

DIAGNOSIS. Cuticle coarsely annulated, notched; in oesophageal region dark, the margins of annules directed anteriad. At short distance behind amphids six longitudinal crests begin consisting of arched and quadratic elements, having a point of reversal in pattern. Amphids circular, showing sexual dimorphism in size, shape, and position. From the cephalic sensillae only six stout setae visible. Buccal cavity nearly cylindrical with a conspicuous, light refractive, crown-like ring bordering the anterior part of it and demarcating it from the very hyaline, high lip region. Ventral gland not seen. Due to the state of preservation no details of the male gonad visible; possibly two opposed testes, the anterior one to the left of intestine. Spicular apparatus weakly cuticularised, relatively simple. Spicules strongly curved, distally with subterminal denticles (claws?), gubernaculum inconspicuous. Female gonad monodelphic with an anterior outstretched ovary left to intestine. Tail conical, plump; with a typical broad tip, surrounded by a hyaline collar. Three caudal glands ending in one common outlet.

TYPE SPECIES. *Dactylaimoides coronifer* sp. nov.

ETYMOLOGY. Similar to *Dactylaimus* Cobb, 1920, especially in the head region.

DISCUSSION. *Dactylaimoides* is a member of the Xyalidae, mainly because of the arrangement of the gonads: two opposed testes in the male, at least the anterior one to the left of intestine and, in the female, one anteriorly directed outstretched ovary at the left of intestine.

Within the Xyalidae *Dactylaimoides* belongs to the group with coarsely annulated cuticle plus longitudinal ornamentation showing V- or otherwise shaped structures, sometimes possessing a point of reversal (*Xenolaimus* Cobb, 1920; *Xyala* Cobb, 1920; *Gonionchus* Cobb, 1920 part or

Crononema Nicholas & Stewart, 1995) – in this respect being reminiscent of characters known from Monoposthiidae, but differing from the latter family clearly by the absence of teeth, a posterior oesophageal bulb and finally in the conditions of the female gonad(s) (outstretched versus reflexed).

The head, lips and amphids have similarities with *Dactylaimus* but also with the *Xenolaimus/ Cenolaimus* complex. In *Dactylaimus* these refer in particular to peculiarities in the organization of the lip region. In *Xenolaimus* these concern the coarse, complicated cuticle (with point of reversal in the longitudinal cuticular ornamentation), peculiarities in the lip region ('thick, somewhat digitate lips', Cobb, 1920), and the 'buccal cavity wide and deep, with two weakly cuticularised teeth or cuticular folds projecting from the base of the mouth to the base of the lips' (Wieser & Hopper, 1967).

Xenolaimus is set off from the new genus in having a cuticle with V-shaped structures arranged in longitudinal rows and the first cuticular annule being wider than the following ones. The head is set off, protrusible, surrounded by a 'balustrade' (Cobb, 1920; see also *Omicronema coronalata* Stewart & Nicholas, 1994). Further it is characterized by 6 + (6+4) cephalic sensillae, amphids located in an enlarged portion of the fifth annule, and asymmetries in the spicular apparatus. *Xenolaimus* does not have that conspicuous crown-like ring in the buccal cavity, typical for *Dactylaimoides*.

Xenolaimus pauroamplus Nichols, 1979, the only further species in this genus, has to be regarded as a doubtful species because of the absence of the V-shaped cuticular ornamentation and the lack of gubernacula as well as apophyses.

Cenolaimus Cobb, 1933, based on the original diagnosis, is mainly separated from the new genus in having 'deep striae grooving the cuticle, wings none', 'spicula (or more likely) the thin, parallel accessory pieces bifurcated distally', and 'setae at base of spinneret three to four times as long as its diameter'. Unfortunately the original diagnosis and description of *C. supersentiens* Cobb, 1933 from New Caledonia is rather scanty and lacks drawings. Cobb himself mentioned the resemblance to *Omicronema*, but decided to establish the new genus for several justified reasons. Because of the alltogether unsufficient description *Cenolaimus* Cobb, 1933 has to be regarded as a genus inquirendum.

Cenolaimus, as understood by Nichols when describing *C. sapeloensis* Nichols, 1979, differs from Cobb's (1933) definition mainly in characters as: cuticle with prominent longitudinal 'striations', labial sensillae setiform (resembling *Xyala*, as does the setation at the head end of her species in general), the lack of long setae at base of spinneret, and well cuticularized spicules and well developed gubernaculum with dorsally directed apophysis (resembling *Xyala*).

C. sapeloensis Nichols, 1979 appears not to be a *Cenolaimus* sensu Cobb, 1933 and seems rather to belong to the group of Xyalidae next to *Xyala* or *Gonionchus*; hence it has to be regarded as a species inquirenda.

Xyala is separated from the new genus by high, hyaline lips without flap-like protrusions, a cuticle with rectangular projections in longitudinal rows aligned to form crests (Stewart & Nicholas, 1994), and a relatively shallow buccal cavity with a short parallel sided rigid part.

Gonionchus differs in having high, hyaline lips their apical parts ending in flap-like protrusions, a conical buccal cavity surrounded by oesophageal tissue, ventrosublateral tooth-like projections, a cuticle with or without longitudinal ornamentations (but never showing V-shaped or arched structures), and spicules with a bifid tip (generic character according to Vinex, 1986).

Dactylaimoides is mainly characterized by the coarse complicated cuticle with longitudinal crests built by arched and rectangular structures and the peculiar strongly light refractive, crown-like buccal ring, the sexual dimorphism in size and position of the amphids, and the typical broad tail tip, surrounded by a hyaline collar.

Dactylaimoides coronifer sp. nov. (Fig. 4)

MATERIAL EXAMINED. HOLOTYPE, QMG218940, δ_1, Innisfail, Forrest Beach, 28.09.1997, embedded in glycerol. D. Blome. PARATYPES, QMG218941, δ_2, QMG218942 φ_1, and QMG218943, φ_2, same data as holotype. OTHER MATERIAL: 3 δ, 3 φ, 8 juv. - Ingham, Forrest Beach; 1 juv. – Ayr, Alva Beach, 01.10.1997. D. Blome.

ETYMOLOGY. Latin *corona*, crown and *ferre*, to bear; referring to the light refractive, crown-like structure in the anterior part of the buccal cavity.

MORPHOMETRIC DATA. δ_1 (holotype): L = 687µm; a = 34.4; b = 4.0; c = 7.9; Spicules: 19µm (left), 18µm (right) on the chord. δ_2: L = 768µm; a = 24.0; b = 3.8; c = 7.9; Spicules: 22µm (left), 19µm (right) on the chord. φ_1: L =

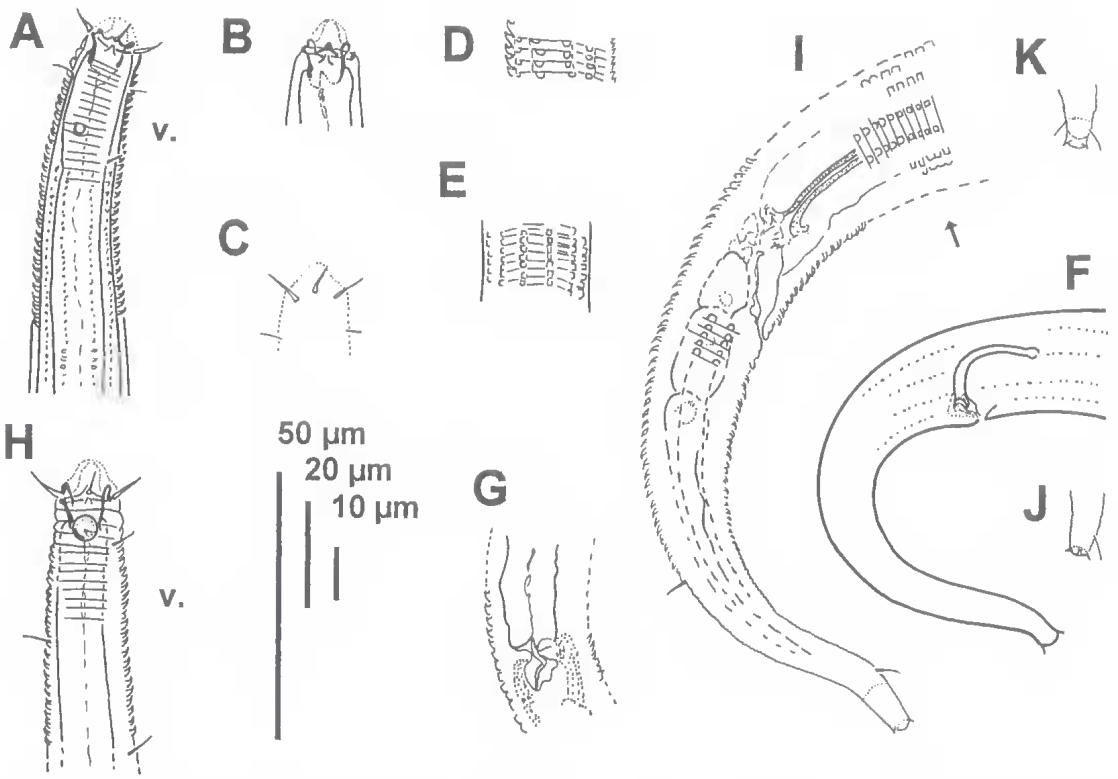

FIG. 4. *Dactylaimoides coronifer* gen. et sp. nov. A-G, ♂, holotype: A, head; B, study of lip region and 'buccal crown'; C, study of sctation at head end; cuticular structurc at D, end of oesophagus; E, middle of the body-length; F, tail region and spicular apparatus; G, end of oesophagus. H-I, ♀, paratype 1: H, head; I, tail region (arrow points to point of reversal in cuticular pattern). J, male, paratype 2: tail tip. K, ♀, paratype 2: tail tip. (v = ventral side).

800µm; a = 24.2; b = 3.7; c = 8.5; V = 75%. $♀_2$: L = 720µm; a = 18.0; b = 3.8; c = 7.5; V = 73%.

DESCRIPTION. Body relativcly small, slender, nearly constant in width throughout the body length, tapering towards the extremities.

Males (mainly referring to holotype). Cuticlc coarsely annulated, notched. Margins of annules in oesophageal region directed anteriorly. In this region the cuticle is particularly thick, dark, especially anterior to nerve ring. At a short distance behind amphids a differentiation into six crests begins on each side of body consisting of arched structures, the curves of which are directed posteriorly at level of cardia. From the latter the single elements of the crests appear to be square towards the posterior end. Crests ending at about 60% of tail length. A point of reversal in the arched elements of the crests not seen. Amphids inconspicuous, with circular apertures of 2µm in $♂_1$, slightly transversely oval (2.4 x 3.2µm) in $♂_2$. Situated 20-22µm posterior to translucent lip region. They have 14 ($♂_1$) – 23% ($♂_2$) of the corresponding diameter. Six stout cephalic setae of 6µm (= 0.6 of c.d.) length visible. Level with base of buccal cavity a pair of subcephalic or neck setae. Lips hyaline - hard to recognize, high; measuring about 6µm from base of light refractive ring surrounding the anterior part of buccal cavity. Buccal cavity cylindrical with well cuticularised dorsal and ventral walls. A crown-like strongly light refractive ring with 6 anteriorly directed projections/arches demarcates the anterior part of buccal cavity (9x7µm) from the lip region. At the base of the buccal cavity a projection of the inner oesophageal wall (fold?) is visible, not as conspicuous as in $♀_1$. Ventral gland not seen. Due to the state of preservation details of the gonads were never clearly discernable. Possibly there are two opposed testes, the anterior one situated to the left of intestine. Spicules symmetrical, strongly curved,

relatively weakly cuticularised, distally attenuated like a pipette. Just before the distal end two subterminal denticles, one directed laterally, the other one directed caudad. The gubernaculum seems to be a tiny triangular structure at the distal end of the spicular pouch. Tail conical, plump (= 4-5 of cloacal diameter), broad at tip, which appears to be surrounded by a hyaline collar. Because this is the situation in all individuals, it can be excluded that the tip is wounded or broken. Three inconspicuous, serial caudal glands. In ♂2 4 small, fleshy, broad-based but pointed terminal setae flank the spinneret - possibly papillae, forming a kind of hyaline collar? One terminal seta, subventrally.

Females (paratypes). The females resemble the males in general appearance. Cuticle in neck region coarser, dark; beginning of crests about 80μm anterior to cardia; exactly at cardia the very coarse annulation of the anterior end ending. In adanal region the cuticle is also coarser and dark, beginning 46μm preanally and ending 66μm behind anus (covering a stretch of 112μm, altogether). Secondary structures (archs) of crests as in males; a point of reversal of those structures seen only in females at about 2.5 anal diameters anterior to anus (= 50-55% (♀2) of distance vulva-anus): here the square structures, covering most of all body annules, change to arched structures again, the curves of which are directed anteriorly (cf. Fig. 41). Amphids strongly sclerotized, circular, with the anterior margins of apertures 11-18μm behind the very translucent lip region, 5μm in diameter (35-39% of c.d.). Lips about 6-8μm high, faint. Six very transparent, little horn-like cephalic setae of 8μm length (= 0.7 of c.d.). Never more than those six setae observed. Buccal cavity in its basal part slightly funnel shaped, with thickened walls, measuring 10μm in length and 7μm in width at maximum. At base of the buccal cavity there is a projection of the inner ventral oesophageal wall (fold?) as in male. Gonad monodelphic; ovary outstretched and directed anteriorly, situated to the left and dorsal of the intestine. Germination zone about 140μm behind cardia. Vulva inconspicuous. Tail as in males. In ♀2 a subdorsal terminal seta seen (Fig. 4K), but that seta was not seen in all specimens (probably broken?). Three caudal glands.

DIAGNOSIS. As for genus.

Paragonionchus gen. nov.

DIAGNOSIS. Cuticle coarsely annulated, notched; margins of annules directed anteriad. In cardiac region 8-10 longitudinal crests begin, consisting of rectangular projections, and ending on tail, when its cylindrical part begins. Amphids inconspicuous, circular, cryptospiral. Cephalic sensillae in three separate rings, with R_3 far behind at level with amphids. Buccal cavity in its major part cylindrical, wide; in its posterior part tapering conically. Cylindrical part with strongly cuticularised strips. Oesophagus inserting at posterior end of cylindrical part of stoma wall. Lips transparent, deeply incised and with complicated cuticularised supporting elements. Ventral gland not seen. Male gonad diorchic; testes opposed, outstretched, posterior one to the right of intestine. Anterior testis possibly to the left of intestine. Spicules regularly bent, proximal ends less cuticularised than the distal, more robust parts. Gubernaculum complicated, close to the spicules, the latter laterally enclosing with protrusions. Tail slender, conical in its anterior part, short cylindrical terminal part. Three slender caudal glands.

TYPE SPECIES. *Paragonionchus sclerolabiatus* sp. nov.

ETYMOLOGY. Greek *para-*, close to, near; similar to *Gonionchus* Cobb, 1920.

DISCUSSION. This new genus also belongs to that group of Xyalidae with strongly annulated cuticle forming longitudinal crests or cuticular ornamentations made of peculiar shaped projections, i.e. *Xyala* Cobb, 1920; *Xenolaimus* Cobb, 1920 and *Gonionchus* Cobb, 1920 (ptm.). *Omicronema* Cobb, 1920 and *Cenolaimus* Cobb, 1933, both also having strongly annulated cuticles, are easily separated by the absence of rectangular projections or longitudinal crests. *Corononema* Nicholas & Stewart, 1995, which has eight longitudinal ridges on its strongly annulated cuticle does not have angular projections on them, and *Xenolaimus* is among others characterized by V-shaped cuticular structures forming longitudinal rows with a point of reversal.

Xyala is separated from the new genus by high, hyaline lips (Stewart & Nicholas, 1994) (without flap-like protrusions) and a buccal cavity with a relatively low (often wider than long), sclerotized cylindrical part, never surrounded by oesophageal musculature and never with cuticular tooth-like projections (Vincx, 1986; Vincx & Furstenberg, 1988).

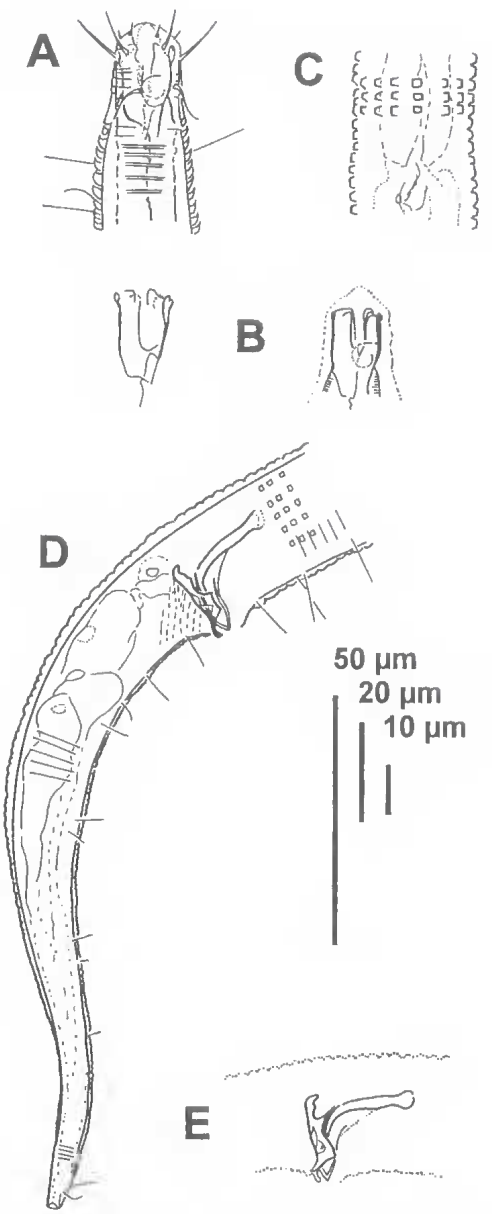

FIG. 5. *Paragonionchus sclerolabiatus* gen. et sp. nov. A-E, ♂, holotype: A, head; B, studies of the sclerotized structures in buccal cavity and lip region; C, cuticular structure in cardia region; D, tail region and spicular apparatus; E, spicular apparatus.

Gonionchus differs in having high, hyaline lips with their apical parts ending in flap-like protrusions, a conical buccal cavity (never with a rigid cylindrical part) surrounded by oesophageal musculature, ventrosublateral tooth-like projections (always recognizable), and spicules with a bifid tip (see Vincx, 1986). According to Vincx (1986) *Gonionchus* contains three species with longitudinal ornamentation (rectangular projections) of the cuticle (*G. heipi*, *G. longicaudatus*, and *G. sensibilis*) to be supplemented by *G. alastairi* Stewart & Nicholas, 1994. But all of them are true members of *Gonionchus* and hence are clearly differenciated from the new genus.

The deeply incised lips with cuticularised structures (archs, clasps, strips) in the new genus are unique within the Xyalidae. Genera with comparable deeply incised lips are known from families of the Enoplida: Thoracostomopsidae (e.g. *Enoploides* Ssaweljev, 1912; *Metenoploides* Wieser, 1953), Enchelidiidae (e.g. *Ditlevsenella* Filipjev, 1927) or Tripyloididae (e.g. *Bathylainus* Cobb, 1894).

Divergent from the general 6 + 10 pattern in the arrangement of the cephalic sensillae of Xyalidae (exception being *Rhynchonema* Cobb, 1920 part, Lorenzen 1981: 240) the new genus shows a pattern of 6+6+4 setae, arranged in three separate rings, being comparable in this respect with the situation in *Dactylaimus* Cobb, 1920 and, possibly, in *Dactylaimoides* gen. n., though in the latter only 6 + 4 setae were visible in two separate rings (the first ring of six (apical) labial sensillae probably hidden due to contraction of the lips or broken?).

Paragonionchus sclerolabiatus sp. nov.
(Fig. 5)

MATERIAL EXAMINED. HOLOTYPE, QMG218944. δ_1, Port Macquarie, Shelly Beach, 03.09.1997, embedded in glycerol. D. Blome. PARATYPE, QMG218945, δ_2, same data as holotype. No other material.

ETYMOLOGY. Greek *skleros*, hard; Latin *labium*, lip; deeply incised lips supported by special sclerotized structures.

MORPHOMETRIC DATA. δ_1 (holotype): L = 1032µm; a = 36.9; b = 4.7; c = 7.5; Spicules 25µm on the chord. δ_2: L = 860µm; a = 28.7; b = 4.7; c = 7.6; Spicules 24µm on the chord.

DESCRIPTION. Body slender, tapering towards the extremities, but being between cardia and cloaca nearly equal in width. Only at head end attenuated to 50% of maximum body width.

Males (mainly referring to holotype). Cuticle strongly annulated, in neck region more prominent; margins of the annules directed anteriorly until about 50µm before cardia (= 77% of oesophageal length). Longitudinal

ornamentation starts about that level with 8-10 longitudinal crests (in lateral view) of rectangular projections. Those crests end on the tail when its cylindrical part begins. Body setation scarce, irregular: immediately behind head several setae, ventral ones measuring 14μm, the dorsal ones 12 μm, and at neck 8μm; other body setae 8μm, in precloacal region 8μm, and on tail 8μm decreasing to 4μm.

Amphids inconspicuous, circular, cryptospiral; situated 12μm behind very hyaline lips/anterior end, 3μm in diameter (= 24% of c.d.).

Lip-tips transparent (weakly cuticularised), 4 μm high (measured from anterior end of thickened parts of buccal wall) Six deeply incised lips with cuticularised archs, clasps, strips. Flap-like protrusions at the apical parts – as usual in *Gonionchus* species – absent. Six delicate, hardly visible labial setae of 2μm length followed by a ring of six slender, hyaline cephalic setae (R_2) of 12μm length. Four hardly visible, hyaline cephalic setae level with amphids (R_3) of at least 8μm length.

Buccal cavity mostly (anterior part) wide, cylindrical, conically tapering at base, measuring 18x9μm. Cylindrical part with strongly cuticularized strips of 18μm length each. Oesophageal musculature inserting at posterior end of cylindrical part of stoma wall. Oesophagus mostly uniformly in width, only slightly widened at posterior end. Cardia oblong, slender heart-shaped. Ventral gland not seen. Gonad diorchic. Testes opposed, outstretched; posterior one situated to the right of intestine; anterior one to the left of intestine? Spicules equal, nearly rectangularly bent. Proximal end up to the knee-shaped curve weakly cuticularised, distal part stronger cuticularised and ending in a widened, V-shaped to sagittiform tip. Gubernaculum strongly cuticularised, close to the spicules, folding up at the sides with protrusions and laterally enclosing them; distally ending with claw-like hook, proximally with free dorsal apophysis. Total length: 17μm.

Tail conical in its anterior part, then cylindrical. Three slender, serial caudal glands. Two subventral caudal setae of 4μm length.

DIAGNOSIS. As for genus.

ACKNOWLEDGEMENTS

I thank Klaus Rohde, University of New England, Armidale, who enabled the stay at the O'Farrell Marine Field Station, Arrawarra Headland and supported the project with equipment and logistical help;

Lerter Cannon, Queensland Museum, Brisbane for logistical help and valuable comments on the manuscript; Howard Choat, James Cook University, Townsville for his kind invitation; and John Collins and Leigh Winsor for valuable assistance during the stay at Townsville. Research support was provided by the Deutsche Forschungsgemeinschaft (Fa 177/5-1, Fa 177/5-3, Schl 536/1-1).

LITERATURE CITED

BLOME, D. 1983. Ökologie der Nematoda eines Sandstrandes der Nordseeinsel Sylt. Mikrofauna des Meeresbodens 88: 1-76.

COBB, N.A. 1920. One hundred new nemas (type species of 100 new genera). Contributions to a Science of Nematology (Baltimore) 9: 217-343.

1933. New nemic genera and species, with taxonomic notes (Ed. by Margaret V. Cobb). The Journal of Parasitology 20: 81-94.

FURSTENBERG, J.P. & VINCX, M. 1988. *Procamacolaimus tubifer* Gerlach, 1953, *Procamacolaimus africanus* sp. nov. and *Eontolaimus capensis* gen. nov., sp. nov., (Nematoda, Leptolaimidae) from South Africa. South African Journal of Zoology 23: 208-214.

GERLACH, S.A. 1953a. Recherches sur la faune des eaux interstitielles de Madagascar. III. Sur quelques Nématodes libres des eaux souterraines littorales de Madagascar. Mémoires de l' Institut Scientifique de Madagascar (A) 8: 73-86.

1953b. Die Nematodenbesiedlung des Sandstrandes und des Küstengrundwassers an der italienischen Küste. I. Systematischer Teil. Archivio Zoologico Italiano 37: 517-640.

1954. Les Nématodes marins libres des eaux souterraines littorales d' Esposende (Portugal). Vie et Milieu 4: 83-94.

1962. Freilebende Meeresnematoden von den Malediven. Kieler Meeresforschungen 18: 81-108.

GERLACH, S.A. & RIEMANN, F. 1973/1974. The Bremerhaven checklist of aquatic nematodes. A catalogue of Nematoda Adenophorea excluding the Dorylaimida. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven, Supplement 4, Part 1 (1973) and Part 2 (1974): 1-736.

HOPE, W.D. & TCHESUNOV, A.V. 1999. *Smithsoninema inaequale* n.g. and n.sp. (Nematoda, Leptolaimidae) inhabiting the test of a foraminiferan. Invertebrate Biology 118: 95-108.

LORENZEN, S. 1981. Entwurf eines phylogenetischen Systems der freilebenden Nematoden. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven, Supplement 7: 1-472.

NICHOLS, J.A. 1979. The occurrence of the subfamily Xyalinae (Nematoda, Monhysteroidea) in the Georgia Bight with a description of two new species. Cahiers de Biologie Marine 20: 151-159.

NOLDT, U. & WEHRENBERG, C. 1984. Quantitative extraction of living Plathelminthes from marine sands. Marine Ecology Progress Series 20: 193-201.

PASTOR DE WARD, C.T. 1985. Free-living marine nematodes from the Deseado River estuary (Chromadoroidea: Chromadoridae, Ethmolaimidae, Cyatholaimidae and Choniolaimidae) Santa Cruz, Argentina. 5. Publicación Especial del Centro Nacional Patagónico 6: 1-83.

PLATT, H. & WARWICK, R.M. 1988. Freeliving Marine Nematodes. Part II. British Chromadorids. Synopses of the British Fauna (New Series) No. 38. 502 pp. (E.J. Brill/Dr. W. Backhuys: Leiden).

STEWART, A.C. & NICHOLAS, W.L. 1994. New species of Xyalidae (Nematoda: Monhysterida) from Australian ocean beaches. Invertebrate Taxonomy 8: 91-115.

THUN, W. VON & RIEMANN, F. 1967. *Echinotheristus* nov. gen. (freilebende Nematoden: Monhysteridae) aus sublitoralem Grobsand der Nordsee. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven 10: 227-237.

VINCX, M. 1986. Free-living marine nematodes from the Southern Bight of the North Sea. I. Notes on species of the genera *Gonionchus* Cobb, 1920, *Neochromadora* Micoletzky, 1924 and *Sabatieria* Rouville, 1903. Hydrobiologia 140: 255-286.

VINCX, M. & FURSTENBERG, J. 1988. Three new Xyalidae species (Nematoda) from South Africa, with a redefinition of the genus *Xyala* Cobb, 1920. Cahiers de Biologie Marine 29: 497-512.

WARWICK, R.M. & COLES, J.W. 1975. Notes on the free-living marine genus *Euchromadora* de Man, 1886 and its allies, with description of two new species (Chromadoridae : Nematoda). Journal of Natural History 9: 403-412.

WIESER, W. & HOPPER, B. 1967. Marine nematodes of the east coast of North America. I. Florida. - Bulletin of the Museum of Comparative Zoology at Harvard College 135: 239-344.